PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference FGMPT04046EPWO	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2004/008581	International filing date *(day/month/year)* 30.07.2004	Priority date *(day/month/year)* 01.08.2003
International Patent Classification (IPC) or national classification and IPC H04L12/56, G06F13/38, H04L29/06, H04M11/06		
Applicant FG MICROTEC GMBH et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 6 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
01.06.2005	26.01.2006
Name and mailing address of the international preliminary examining authority: European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840	Authorized Officer Siebel, C Telephone No. +49 30 25901-485

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/008581

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-44	as originally filed
Claims, Numbers	
1-19	filed with telefax on 18.11.2005
Drawings, Sheets	
1/7-7/7	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-19
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-19
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-19
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:
D1: US2003/0145119 A1, 31.07.2003

1. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and discloses (the references in parentheses applying to this document):

An application unit (called "terminal equipment unit" in D1, fig. 3a (40)) comprising

a) - at least one protocol stack for wireless communication using a mobile communication network (fig. 3b, 4)
- at least one physical interface (fig. 4); and
- at least one application (on top of D1, fig. 3b (70) - not shown (implicit disclosure)) adapted for exchanging data traffic (with eg a "network remote server", in D1, fig. 3a (60)) with said at least one protocol stack within the application unit (D1, fig. 3b (70-72)), said data traffic and protocol stack being adapted for wireless communication (as it is transmitted over wireless link in D1, fig. 3a (56)) using said mobile communication network (D1, fig. 3a (56), see also paragraphs 9 and 12);

b) wherein said at least one protocol stack is adapted for processing said data traffic from said at least one application (implicit disclosure, eg "processing" referring to enveloping received data in an IP-packet, determination of total length while setting the header eg) and transferring the processed data traffic to said at least one physical interface (belonging to the Ethernet connection D1, fig. 3b (72-74) corresponding to the link D1, fig. 3a, (40-44));

1.1 The subject-matter of claim 1 differs in that the protocol stack is adapted for receiving at least one IP packet containing flow control information from a modem unit responsible for setting up a wireless connection with said mobile communication network via said at least one physical interface. Said flow control information is collected by the modem unit and contains information about the status of the wireless connection set up by the modem unit. Predicted information about a future status of the wireless connection is created either in the modem unit or in the application unit and sent to the respective other unit.

1.2 The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

1.3 The problem to be solved by the present invention may therefore be regarded as how to ensure QoS in a distributed system and to optimize packet flows data flow in the application unit for optimum QoS.

1.4 The solution proposed in claim 1 of the present application involves an inventive step (Article 33(3) PCT) for the following reasons:

The proposed solution is neither disclosed in D1 or in combination with D1 nor is it merely one of several straightforward possibilities for the person skilled in the art from which he would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

2. The modem related **claim 9**, user equipment specific independent **claim 11**, method specific independent **claim 13**, computer program product specific independent **claim 14**, computer loadable data structure specific independent **claim 15**, computer program specific independent **claim 16**, computer program comprising program means specific independent **claim 17** and storage medium respectively specific independent **claim 19** are corresponding claims to the independent method claim 1 or 13 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

2. The remaining claims 2-8, 10, 12 and 18 are dependent on claim 1, 9, 11 or 17 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Claims

1. An application unit (1) comprising:

a) - at least one protocol stack for wireless communication using a mobile communication network;

- at least one physical interface (3); and

- at least one application adapted for exchanging data traffic with said at least one protocol stack within the application unit, said data traffic and protocol stack being adapted for wireless communication using said mobile communication network;

b) wherein said at least one protocol stack is adapted for processing said data traffic from said at least one application and transferring the processed data traffic to said at least one physical interface (3);

characterized in that

c) said at least one protocol stack is adapted for receiving via said at least one physical interface (3) at least one internet protocol, IP, packet containing flow control information;

d) said at least one IP packet is sent via said at least one physical interface (3) from a modem unit (2) responsible for setting up a wireless connection with said mobile communication network;

e) said flow control information is collected by the modem unit (2) and contains information about the actual status of the wireless connection set up by the modem unit;

f) further flow control information is derived from said information about the actual status of the wireless connection and comprises predicted information about a future status of the wireless connection; and in that

g) the prediction is performed in the modem unit or in the application unit and the prediction is sent to the respective other unit via said at least one physical interface (3).

2. The application unit according to one of the preceding claims,

characterized in that

said application unit (1) is adapted for transmitting to said modem unit (2) at least one of:

- QoS profiles of said applications, or
- a request sent to the modem unit to trigger the modem unit to send IP packets containing said flow control information to the application unit.

3. The application unit according to one of the preceding claims,

characterized by

an application unit collector for extracting said IP packets containing flow control information out of an IP packet flow.

4. The application unit according to the preceding claim,

characterized in that

the application unit collector builds at least one IP packet which is used to request flow control information from the modem.

5. The application unit according to the preceding claim,

characterized in that

when requesting flow control information from the modem, the application unit collector uses in an authentication protocol as username a desired IP address.

6. The application unit according to one of the preceding claims,

characterized by

a first QoS packet processor module (65) in the protocol stack of the application unit adapted for at least one of monitoring and modifying the data traffic.

7. The application unit according to one of the preceding claims,

characterized by

a media sense unit responsible for detecting

a) which modem is connected to the application unit, and/or

b) whether this modem is usable at the moment; and/or

c) which parameters are supported by the modem.

8. The application unit according to one of the preceding claims,

characterized by

a decider module for controlling the data flow for optimum quality of service based on the received flow control information;

wherein the decider uses a look-up table for deriving the decisions;

wherein the lookup table has a higher layer protocol stack state and the flow control information as input and an action to be taken for the higher layer protocol stack of the application unit as output.

9. A modem unit (2) responsible for setting up a wireless connection with a mobile communication network comprising:

a) a broadcast facility adapted for setting up a wireless connection for mobile communication;

b) at least one transmission protocol stack (8) adapted for transferring data traffic between said broadcast facility and at least one physical interface (3);

characterized by

c) a sub-collector for collecting flow control information about the status of the wireless connection from said transmission protocol stack;

d) a unit for creating at least one IP packet containing the flow control information; and

e) a sender for sending said at least one IP packet from the modem unit via said at least one physical interface (3) to an application unit connected to the modem unit via said at least one physical interface (3);

f) wherein said flow control information comprises predicted information about a future status of the wireless connection; and

g) wherein the prediction is performed in the modem unit.

10. The modem unit according to the preceding claim, **characterized by**

a second QoS packet processor module (75) adapted for at least one of monitoring and modifying the data traffic between said at least one physical interface (3) and the transmission protocol stack (8).

11. A user equipment comprising at least one application unit (1) according to any of claims 1 to 8 that is connected, via said at least one physical interface (3), with a modem unit (2) according to any of claims 9 to 10.

12. The user equipment according to the preceding claim, **characterized in that**

said modem unit (2) and at least one of the application units (1) are implemented as one embedded mobile device, preferably as a smartphone.

13. A method for optimizing data flow in a distributed user equipment for mobile communication,

a) said user equipment comprising at least one application unit and a modem unit (2) responsible for setting up a wireless connection with a mobile communication network, wherein the modem unit is connected to the application unit via at least one physical interface (3);

b) with at least one application being installed on at least one of the application units (1);

c) wherein the modem unit is adapted for setting up a wireless connection for mobile communication;

characterized by said method comprising the steps of:

d) within the modem unit (2) collecting flow control information about the status of the wireless connection;

e) within the modem unit (2) creating at least one IP packet containing the flow control information;

f) sending said IP packets from the modem unit (2) to the application unit via said at least one physical interface (3);

g) controlling the data flow in the application unit for optimum quality of service based on the received flow control information;

h) wherein said flow control information comprises predicted information about a future status of the wireless connection; and

i) wherein the prediction is performed in the modem unit.

14. Computer program product, comprising computer program code means,

wherein the program code means can be stored or are stored on a storage medium; and

wherein the program code means are adapted to perform the method of the method claim 13, if the program code means are executed on a mobile device, a processing system, or a digital signal processor.

15. A computer loadable data structure, that is adapted to perform the method according to the method claim 13 while the

data structure is being executed on a mobile device, a processing system, or a digital signal processor.

16. A computer program, wherein the computer program is adapted to perform the method according to the method claim 13 while the computer program is being executed on a mobile device, a processing system, or a digital signal processor.

17. A computer program comprising program means for performing the method according to the method claim 13 while the computer program is being executed on a mobile device, a processing system, or a digital signal processor.

18. A computer program comprising program means according to the preceding claim, wherein the program means are stored on a storage medium readable to a computer.

19. A storage medium, wherein a data structure is stored on the storage medium and wherein the data structure is adapted to perform the method according to the method claim 13 after having been loaded at least partially into a main and/or working storage of a mobile device, a processing system, or a digital signal processor.